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UNIVERSITY COMPUTER CENTER

UNIVERSITY COMPUTER CENTER NEWSLETTER

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Editorial Notice

The Computer Center Newsletter is published by the University of Arizona Computer Center for the purpose of disseminating general information to users of this Center. The format is informal and the content will include anything of interest to readers. The Newsletter will be published the middle of each month.

Contributions

Although most of our items will be contributed by the staff, the University of Arizona Computer Center welcomes contributions from any source. Your comments will provide assistance in improving the contents of the publication. Material submitted may be of any reasonable length. Long items will be serialized in several issues. What constitutes publishable material? The following are suggestions, but by no means limitations:

General information articles, new mathematical techniques, programming tricks and techniques, description of useful programs, little "goodies", pitfalls discovered, comments and suggestions about our operations

Here is the chance to tell the University of Arizona Computer Center what is wrong (or right) with us. Ideas, suggestions, and constructive criticisms, etc., that will help us improve our service to you are solicited. Please send your contribution to:

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Announcements

Workshops

Beginning in August the Computer Center will initiate a series of programming workshops. The workshops are intended to be an exchange of programming information between Computer Center personnel and the users. They will be informal and will deal with topics of average to advanced difficulty. However, programmers with a more basic knowledge should also benefit by attending.

It is hoped that users will suggest topics to be discussed. Anything of general interest is fair game. Some possible continuing topics are: the status of the major systems (FORTRAN, COMPASS, COBOL, etc.) including bugs; announcements of future system improvements, new routines added to the system, and so forth. Suggested subjects which could take one or more meetings include: improving program efficiency, use of UPDATE-EDITSYM, techniques for constructing program libraries, the philosophy and general organization of the SCOPE system, message and diagnostic interpretation, etc.

The first two meetings will be held August 6 and 20, 1968, in Room #212, PMM Building at 1:40 p.m. to 2:30 p.m. All users are encouraged to attend these first meetings, in which some organization will be set for following meetings.

Billing Algorithm

The Computer Center's billing algorithm is designed to accomplish several objectives. It necessarily aims to cover unappropriated costs of Center operation, assuming a certain volume of use. It is designed to charge a customer equitably for the use he makes of the Center's facilities. At least as importantly, it is designed to charge a customer for time on facilities which he makes unavailable to other users.

Efficient use of the 6400 facilities will increase a user's throughput, minimize his costs and make the facilities available to other users.

The billing algorithm is:

$A(CPT)+A'(PRT+RET+PUT+PPT)$ where

CPT is Control Point Time

PRT " Print Time

RET " Read "

PUT " Punch "

PPT " Peripheral Processor Time

Billing Algorithm - continued

For University users the following rates apply:

A=\$3.500 per minute

A' = .833 " "

The dayfile information printed as the last page of each job contains sufficient information to allow a user to estimate the cost of the run with reasonable accuracy. PP time is explicitly listed. The printed time is reduced, in the monthly billing run, XX Time, non billable PP overhead time. CPT is the difference between the time of the XX entry and the time of the job card entry in the dayfile. Deductions are automatically made in the billing run for the time in a roll-out status or time waiting for a tape to be hung and field length restored. Card read, punch and print time are not explicitly shown on the dayfile. However, their cost may be reasonably estimated. It costs approximately \$1.00 to read 1000 cards, print a thousand lines or punch 250 cards.

The billing algorithm is under continual review by the Computer Center staff and is subject to change to reflect improvement in hardware or software capability of the Center. For example: an increase in core capacity to 64K will undoubtedly result in revising the algorithm to take into account the proportion of central memory actually used by each job. Any such charges will in general be a result of system improvement and result in more computing for a given dollar expenditure.

Questions and comments concerning the billing algorithm should be directed to the Assistant Director on extension 2917. Questions concerning charges on a monthly invoice should be directed to the bookkeeper on extension 2125.

Offset cards in punched decks

The punch routine offsets in the punch stacker the following cards:

1. Job Header Cards
2. End of Record Cards (7-8-9 cards)
3. " " File " (6-7-8-9 ")
4. Erroneously Punched Cards

All offset cards will be marked on the right edge by the operators. Customers should examine the punched output for marked cards. Upon detection of an erroneously punched card, the punch routine repunches it and the card following it. Both of these cards will be offset by the punch and marked by the operator.

Job Scheduling

To provide the shortest possible turn around time and to handle the maximum number of jobs on the day shift the Computer Center will process jobs with shortest time estimates first. The priority scheme will stack jobs by priority in inverse relation to your time estimate. The scheme will also roll-out any job in progress if the estimated remaining running time is more than twice that of a job subsequently placed in the input queue.

To secure the maximum benefit from this priority allocation, users should make every effort to design and test their programs in modules which require short runs.

Long running production jobs will normally be deferred by the priority scheme to the night shift. Barring equipment malfunction these jobs should be available for pick up by 7:00 a.m. the following day.

Supplies-Rented (in-shop use only)

The University Computer Center now has tapes available for rent. Tapes may be obtained through Mrs. Elizabeth Wheeler, Tape Librarian, Room #525, PMM Building. There will be no charge for the first 15 days but for any additional time needed there will be a charge of \$3.00 per month or portion thereof.

Hardware Status

6400 System Hardware Status for June '68.

System was powered up for a total of 545.0 hours. No main frame troubles were encountered in June. Time lost on peripheral equipment was approximately 24 hours for Card Reader, Printer, Punch and Tapes.

Two major options were installed in the 6400 Disc file system (Std. Opt. 10098 & 10124.) These two options will allow the system to access the disc at a much higher rate and thus significantly improve "through-put time."

Std. Opt. 10071 was also installed on all four 607 tape drives. This option consists of snap-lock hubs, which will make the mounting of magnetic tapes a much easier and faster operation.

Literature Status

Manuals available for reference

A complete set of CDC 6400 Manuals is available in Room 525, PMM Building for customers' use. We no longer have a check out service, but you may request XEROX copies of any material you wish (at the cost of 10¢ per page.) If you wish to purchase manuals there is a catalog available in Room 525, PMM Building for reference. However, they must be ordered through the bookstore.

Available Programs

A bulletin describing routines currently available in the Computer Center Library has been distributed to all Department Heads. Additional copies are available in PMM 525 for reference in that room. Routines available include a statistical package, a Matrix Algebra package, ANOVA 44 (Flexible Analysis of Variance,) MLR (Multiple Linear Regression,) and others.

Plotter Documentation

Plotter users are reminded that writeups for the Software are now available from the consultant, PMM 525. The plotter subroutines are now in the system, and the writeups describe their function and method of use.

Additions to the FORTRAN manual are appended to this Newsletter. They should be removed and placed in your manual.

Software Status

This section of the Newsletter is intended to provide the user with information concerning the status of major software systems available on the CDC 6400. For each system its name, current version number, explanation of changes since the previous version, and description of known bugs and deficiencies are presented. In addition new programs will be announced when they become available.

A complete list of programs available to 6400 users is maintained by the Computer Center Librarian in Room 525, PMM Building. This list contains programs which can be obtained through VIM, the official CDC 6000 series users' group, as well as those which are on hand.

SCOPE 3.1.102E

SCOPE is the name of the 6400's operating system. Version 3.1.102E has been in operation since July 8, 1968. The differences between this version and the previous version, 3.1.102D, which was put into operation on June 18 are not noticeable to the average user. The changes significantly improve the probability of successful recovery in the event of operating system failure. A major deficiency in the current system is that the debug aids described in Chapter 11 of the latest SCOPE reference manual are not available.

RUN 2.3.102

This version of the FORTRAN compiler has been in operation since April. Major bugs include:

RUN 2.3.102 - continued

1. Numbers output under G format are sometimes off by a factor of 10
2. Logical IF statements using variables not declared type LOGICAL do not always function as one would predict. Strictly speaking, this use of the logical IF statement is not syntactically correct and should be avoided.

COMPASS 1.0.109

COMPASS is the comprehensive assembly system for the 6400. It makes the basic machine instructions available to the programmer. The current version has been in operation since June 18 and is quite reliable.

COBOL 2.0

The current version of COBOL has been in operation since May 11. This COBOL compiler is relatively new and still contains some bugs. It is quite usable in its present state, however. See the separate section on COBOL for some specific suggestions as to what to watch for or to avoid.

SORT/MERGE 1.0

The current version of SORT/MERGE has been in operation since April. Some bugs are

1. Logical records (line images) which break across 2 physical tape records can be read and sorted correctly but they cannot be written correctly. It is necessary to specify a blocking factor for output which insures that logical records do not break across physical records. Physical tape records are 1280 or 5120 characters long for BCD and binary tapes, respectively.
2. Type R records with default record marks can be blocked in physical records on input but are always output as separate physical records.

FTN (Pre-release)

FTN is a pre-release (not officially supported by CDC) FORTRAN compiler. The source language is an extended version of FORTRAN IV and is described in the Control Data FORTRAN extended reference manual, Pub. No. 60176600B. Time for compilation under FTN is greater than under RUN but the object code produced is somewhat more efficient. The major deficiency of FTN as it exists on the system now is that no object time routines are available. This, of course, prohibits execution of programs compiled under FTN. These object time routines can be made available for users who have a need for them.

SIMSCRIPT (Pre-release)

SIMSCRIPT, a simulation programming language, is available as a pre-release version (not officially supported by CDC.) The Control Data SIMSCRIPT reference manual, Pub. No. 60178300 is available. Only the compiler exists on the current system library. The object time routines are not on it. These routines will be made available for customers who plan to use SIMSCRIPT.

Library Programs

The following routines exist on the current system library. These routines are callable from control cards:

MLR	Multiple Liner Regression
ANV44	Analysis of Variance
PRINT	Prints contents of magnetic tape
SKIP	Skips files a records on tape

Library Subprograms

The following routines exist on the library as subprograms most of which are callable from FORTRAN:

CDC Statistical Routines: These routines are described in CDC's Statistical Subroutines Reference Manual Pub. No. 60135300. Four of the described routines are not in the current version of the system, however. These are Principal Component Analysis, Multiple Regression Analysis, Stepwise Regression Analysis and Analysis of Variance.

CDC MATRIX - These MATRIX routines are described in the Matrix Algebra Subroutines Reference Manual Pub. No. 60135200.

Plotter Routine - These routines facilitate the use of the CALCOMP digital plotter. They are described in a Computer Center document entitled "Use of CALCOMP 665 Digital Plotter."

New Programs

Users who have routines that are of general interest or utility and would like to contribute them to the library are encouraged to do so. The desired format for submittal may be obtained from the consultant.

COBOL Barbs

Current COBOL problems and restrictions with corresponding solutions, if any, will be included in each Newsletter.

COBOL Barbs - continued

1. The minimum field length for a COBOL compile is 53000 (OCTAL) locations. This means that the "CM" parameter on your job card should specify 53000 or larger. Smaller field lengths result in "BUFFER ARG ERROR" or "TIME LIMIT".
2. The description of the SORT verb on page 4--57 of the COBOL manual (Pub. No. 60191200A) states that both the "USING" and "GIVING" files are opened and closed. This is not true. The "GIVING" file is not closed after the SORT. You must close this file and then reopen it before using it.
3. If the amount of data and original sort order is such that a COBOL SORT cannot be performed entirely in core the SORT/MERGE routine will request additional scratch files. These files are named CSORT1, CSORT2, CSORT3, and CSORT4. The operator must assign these files to either tape or disk. You can insure that the files are assigned to disk by using rewind cards prior to the "LGO" card. An example follows:
REWIND (CSORT1)
4. SECTION and PARAGRAPH names are not permitted following the "DECLARATIVES" statement and before the "ENTRY" statement. The example in the book is wrong in regards to PARAGRAPH names and the software is wrong in regards to SECTION names.
5. A limit of 49 paragraph names per numbered section currently exists.
6. We are currently unsuccessful in using overlays. Several of the problems have been solved and we, as well as CDC, are working to correct the remainder.
7. All of our known BCD tape problems have been corrected..
8. Binary files are currently not being recommended. We have trouble recognizing the "END OF FILE" on binary TAPE files. This would be an easy problem to circumvent except that binary moves seem to have difficulty in recognizing end of line terminators. The combined problems force us to recommend that you use BCD files for the time being. We hope to have the solution soon.
9. SORT/MERGE destroys register B1 when returning from a sort called by the COBOL "SORT" verb. If you have a "STOP RUN" statement following the "SORT" statement then your program will hang until "TIME LIMIT". Your processing will have been successfully completed. The difficulty is concerned with your program's notification to the MONITOR that processing is finished.

We have notified CDC of all of the above noted problems and they are currently working on them. We are also pursuing a solution to the problems. Watch future Newsletters for a continued status report.

Consultants' Corner

FORTTRAN users should note that there is a limit on the number of lines of printed output for each job. This limit can be specified as the 7th parameter on the run card, and if not specified, a line limit of 10000₈ is assumed (4096 lines.) For object programs the line limit is as specified or assumed on the run which created the object deck.

Machine Usage

Below is a list of the University Computer Center machine usage for the months of May and June.

	<u>Month</u>	<u>No. Jobs</u>	<u>Control Point Time</u>
CDC 6400	May	12,635	932,134 sec.
	June	6,172	674,133 "
IBM 1401	May	484	198 hrs.
	June	376	167 "
	<u>Month</u>	<u>Jobs</u>	<u>Cards</u>
Keypunching & Verifying	May	48	23,601 cards
	June	29	9,826 "

Lower utilization in June reflects a reduction in student jobs during the vacation period.

Little Known But Useful Facts

The library subroutine OVERFL merely checks the value of the last number stored by an arithmetic type operation to determine whether or not an "OVERFLOW CONDITION" exists. To determine the legality of a particular variable, a better choice is the function LEGVAR, described in FORTRAN Extended Ref. Manual

EXAMPLE: I=LEGVAR(X)

The value returned for I is: -1 if X is indefinite
 0 if X is normal
 +1 if X is infinite

Personnel

During the month of June the University Computer Center acquired four new employees for the Summer to ease the work load during vacation time.

Personnel - continued

Edward Baldwin obtained two B.S. degrees from Pennsylvania State University; a Master's degree from the University of Arizona in Education with a Mathematics major. He will return to his regular job in August as a Mathematics and Science teacher at Palo Verde High School. Edward is working as a machine operator.

Mary Meaney, a student at the University of Arizona, is doing keypunching and clerical work.

Whitney Johnson has a B.S. degree from New Mexico State University in Mathematics. He is working full time this Summer and will be half time starting in September. Whitney is our consultant Monday through Friday, from 10:00 a.m. to 12:00 Noon.

Jim Stapleton, a student at the University of Arizona, is working for us as a programmer this Summer.

Additions to FORTRAN Manual

The following is a summary of the error messages which have been added to the RUN compiler:

CBF**

LABELED COMMON BLOCKS EXCEED MAX OF 61

The user has violated the restriction that he have no more than 61 labeled COMMON blocks.

DBF**

ARRAY SIZE OUT OF RANGE

A constant used as an array subscripts cannot be contained in seventeen (17) bits.

GFF**

FORMAT NUMBER REFERENCED BY CONTROL STATEMENT

A statement number attached to a FORMAT statement is being referenced by a control statement, e.g. a GOTØ statement. The FORMAT statement which caused this will have preceded the source statement causing the diagnostic.

IOF**

ILLEGAL I/O DESIGNATOR

An I/O designator has a variable name of more than 6 characters in a numeric value of more than two digits (see Page 10 - 1 of the FORTRAN manual.)

NOF**

NO OBJECT CODE GENERATED

The source program has generated no object code. This error will occur if a void file is input to the compiler.

NP***

NO PATH TO THIS STATEMENT

The flagged statement cannot be executed at object time. This diagnostic is not fatal.

INF**

PROGRAM HAS MORE THAN 50 ARGUMENTS

The restriction that a PROGRAM card have no more than 50 arguments has been violated.

Additions to FORTRAN Manual - continued

*FAF***

FUNCTION HAS NO ARGUMENT

The FUNCTION has a void parameter list, although a function must have at least one argument.

A DAYFILE message has been added which indicates that an error has been detected in the RUN cards fields 2 through 7 (See page F-1 of the FORTRAN reference manual.) The error message in

RUN CARD FIELD IN ERROR.XXXXXXXXXX, where XXXXXXXXXXXX is the input field in error.